

Abstract

A method of influencing variations in composition of thin films is described. The elemental plasma field distribution in sputtering systems is manipulated by generating a nonuniform electric field along a surface of the substrate to alter the composition by differentially re-sputtering the target elements. The nonuniform electric field is applied by one or more electrodes in contact with a conductive surface or by using an RF bias signal. The nonuniform electric field is used to modulate the kinetic energy of the ions generated in the plasma which strike the thin film's surface. Since the kinetic energy and the mass of the sputtering gas ions and neutrals affect the re-sputtering rate, the nonuniform electric field differentially affects the elements being deposited according to mass. By applying varying electric potentials at a plurality of points on a conductive surface of a substrate, the electric field across the surface of the substrate can be modulated in a variety of patterns. For example, the field can be varied along the circumferential and/or radial direction of a disk. In the preferred embodiment a radial voltage gradient is applied to a conductive surface of a disk on which a magnetic thin film is being formed to radially modulate the platinum content of the magnetic film. Modulating the radial platinum content in turn modulates the radial coercivity.